



STATISTICALLY SIGNIFICANT MACROECONOMIC VARIABLES THAT EXPLAIN NOTEWORTHY VARIATION IN GDP GROWTH RATE

Shubhi Singh

Research Scholar

Introduction

“We are neither hawks, nor doves. We are actually owls”

In 2014, the RBI Governor Raghuram G. Rajan took to ornithology to explain the Central Bank's policy stance and its intents when he uttered the above-mentioned quote. Owl is a symbol of wisdom and that RBI is vigilant, doing what is necessary for the economy. The Owl has since then become symbolic of India's Monetary Policy stance i.e. “vigilantism”. In recent years however, the ineffectiveness of the India's monetary policy, plagued by the broken interest rate transmission mechanism and a slow Banks Credit Growth despite recent liquidity push by Monetary Policy Committee, has come to question the very owl-like wisdom that the RBI once represented. Indian Economy has been experiencing a growth slow-down, much before covid-induced lockdowns and global fall in demand even hit the world. The efforts on account of both conventional Monetary and Fiscal Policies have been made to pull the economy out of this phase of economic slow-down. In light of such economic decision making, it is imperative that we can narrow down specific policy tool that can statistically explain a large degree of variation in GDP Growth rate and could be then be accorded priority for future policy initiatives. This paper aims to determine the variation in GDP Growth rate that can statistically significantly be attributed to a select few economic policy variables.

LITERATURE REVIEW

There seems to be a renewed interest in the estimation of India's GDP growth figures in the past few years. A thorough attempt was made by Aravind Subramanian (2019) in this regard to estimate India's recent Growth trend by adopting a methodology divergent from that which is adopted for official Government of India estimates. In an effort to bring to light the “mis-estimation” of GDP growth figures, Subramanian (2019) identified such indicators (Credit, Export, Import, Electricity Consumption) that co-move with growth and showed that this relationship is reasonable and robust in that the indicators can explain a fair amount of the variation in GDP growth. An explicit identification of such variables therefore became the primary motivation to analyse the extent of variation in GDP that can be attributed to these variables alone (this is essentially the premise of this paper).

Subramanian & Felman (2019) opined that instead of victoriously emerging out of the Twin-Balance Sheet crisis, India seems to have now entered the phase of a Four Balance Sheet Crisis triggered by the collapse of IL&FS NBFC in 2018. While Banks and Infrastructure companies were the two sectors that were originally plagued by the Twin Balance sheet crisis, NBFC's and Real Estate companies have now joined this bandwagon post 2018, culminating into a more challenging Four Balance Sheet crisis, worsening the growth dynamics in the country. Subramanian & Felman (2019) have suggested various policy alternatives that can successfully pull India out of this recent growth slowdown. They are of the opinion that conventional monetary and fiscal policy tools will be inefficient in addressing the current problem. While monetary policy is stymied by a broken transmission mechanism, large fiscal stimulus will only push up already-high interest rates, worsening the growth dynamic. Asset Quality Review (AQR), Insolvency and Bankruptcy Code (IBC), Prompt Corrective Action (PCA), creation of Bad Banks, grouping the PSB's under a government holding company are some of the policy alternatives that can aid growth revival (Subramanian & Felman, 2019). Analysing the statistical significance of these banking sector regulatory policies in explaining GDP growth variations therefore became another question of investigation in this paper.

Acharya & Rajan (2020) have accorded noteworthy importance to banking framework, specifically the Credit growth framework, in its contribution to GDP growth revival. According to them, banking in India seems more a manifestation of the boom-and-bust cycle view of credit rather than credit growth leading to sustained economic growth. Lack of credit penetration in India is a hindrance to the growth potential. With government deficits and debt levels reaching enormous levels, there simply are not enough budgetary resources to recapitalize banks. An encumbered, under-capitalized public sector banking system will not lend well, which will be a huge tax on growth, as it has been for the last six years (Acharya

& Rajan, 2020). Therefore, an investigation of the impact of Credit growth on India's GDP growth also became a part of the analysis of this paper.

METHODOLOGY

RESEARCH QUESTION - To determine the variation in GDP Growth rate that can statistically significantly be attributed to a select few economic policy variables (selected based on extensive literature review)

DEPENDENT VARIABLE – GDP Growth Rate (Quarterly, Y-o-Y)

INDEPENDENT VARIABLES (and the theoretical justification for including them in the regression analysis)

1. **Interest Rate Differential** = Weighted Average Lending Rate – Repo Rate (Quarterly average)

Repo rate (the interest rate at which banks borrow from the RBI) determines the minimum cost of funds for banks. When this rate falls, deposit rates tend to follow, as there is little need to pay for high-cost deposits when funds are available for less at the central bank. And when deposit rates fall, competition then brings down rates on all types of credit, such as loans, government securities, corporate bonds. That is, Weighted Average Lending rates of Scheduled Commercial Banks also reduces. Of-late, this trend has not been seen in practice. At the same time as the RBI has been reducing its rates, banks—conscious of their own weak financial positions and seeing dangers in every area of their operations—have been increasing the risk premia they charge their borrowers. As a result, lending rates have not followed the RBI repo rate down, opening up a virtually unprecedented spread between the two rates, amounting to approximately 6 percentage points, a punishingly high level at a time when the economy is weak and firms are struggling to pay their debts. As repo rate cuts are not getting translated into lending rate reductions, it is rendering ineffective Central Bank's efforts to deploy monetary policy in rescuing the slowing down economic growth (problem of broken transmission mechanism). To analyse the extent to which this broken transmission mechanism is hindering economic growth, this Interest differential has been included as an explanatory variable.

2. **Credit Growth Rate of Scheduled Commercial Banks** - (Quarterly growth rates, Y-o-Y)

Credit growth rate indicates aggressive and active participation of the banking sector in the real economy, and a lack thereof can hinder the growth potential of the economy (Acharya & Rajan, 2020). Given the glaring NPAs plaguing the Public Sector Bank's Balance Sheets, Recapitalization efforts on the part of the government became the only recourse in recent years. However, with government deficits and debt levels reaching enormous levels, there simply are not enough budgetary resources to recapitalize banks. Credit growth can reduce the dependence of the banking infrastructure on recapitalization efforts of the government.

3. **Debt to GDP Ratio** – (Quarterly data)
4. **FDI growth rate** (Quarterly growth rate, Y-o-Y)
5. **Net Exports as a percentage of GDP** (Quarterly data)

Apart from these independent variables, several regression models which included dummy variables for bank policies like AQR (Asset Quality Review) and PCA (Prompt Corrective Action) were also tried. In all such models, these two dummy variables (signalling the years in which such policies were implemented) were found to be statistically insignificant suggesting that these financial regulatory policies did not play a noteworthy role in explaining variations in GDP growth rates directly, though their contribution in banking sector reforms cannot be dismissed.

Data Set and Tests for Stationarity, Autocorrelation and Heteroscedasticity

Quarterly data for 32 quarters was taken from financial year FY 2012-13 to financial year FY 2019-20 for all the variables. A multivariate OLS regression was conducted (using gretl statistical package) on the above-mentioned time series data. The quarterly data for GDP Growth Rate, FDI Growth Rate and Credit Growth Rate were all exhibiting a time trend (see graphs 1-5). To correct for the same, the First Difference Form (quarterly, Y-o-Y difference) for these three time series data was included as part of the regression analysis. To test for the stationarity of the time series data, Augmented-Dicky Fuller Unit Root Test was conducted (after taking the first difference form). The result showed that the Null Hypothesis was rejected, i.e. time series does not have a unit root and that the series is stationary in the first difference form (Table 3). To test for the presence of heteroscedasticity, BP test was conducted (Table 2). We do not reject the null hypothesis suggesting absence of Heteroscedasticity. The OLS regression results are mentioned in Table 1. The Durbin-Wharton test statistic is 2.09 (see Table 2), indicating that we do not reject the Null Hypothesis i.e. there does not exist evidence of Autocorrelation. The adjusted R² is 0.57 suggesting that the concerned explanatory variables together explain 57% of the variation in dependent variable.

Table 1 – OLS Regression Results

Model 1: OLS, using observations 2012:1-2019:4 (T = 32)
Dependent variable: GDPgrowthrate

	coefficient	std. error	t-ratio	p-value
const	-58.2585	13.2671	-4.391	0.0002 ***
Interest-Differ ~	-1.65899	0.882851	-1.879	0.0715 *
CreditGrowthRate~	0.235153	0.0907065	2.592	0.0154 **
FDIGrowthRate~	0.00850351	0.00319068	2.665	0.0130 **
NetExports	0.573386	0.236925	2.420	0.0228 **
DebtGDPRatio	1.49147	0.316331	4.715	7.13e-05 ***
Mean dependent var	-0.328594	S.D. dependent var	1.958472	
Sum squared resid	50.74254	S.E. of regression	1.397010	
R-squared	0.573248	Adjusted R-squared	0.491180	
F(5, 26)	6.985059	P-value(F)	0.000296	
Log-likelihood	-52.78249	Akaike criterion	117.5650	
Schwarz criterion	126.3594	Hannan-Quinn	120.4801	
rho	-0.053022	Durbin-Watson	2.093673	

Table 2 – BP Test for Heteroscedasticity

Null Hypothesis – Homoscedasticity is present

Interpretation - Since p value is more than the critical value, we do not reject the Null. The residuals do not exhibit Heteroscedasticity

Breusch-Pagan test for heteroskedasticity
OLS, using observations 2012:1-2019:4 (T = 32)
Dependent variable: scaled uhat^2

	coefficient	std. error	t-ratio	p-value
const	0.629277	11.8045	0.05331	0.9579
LendingRateTrans~	-0.447235	0.785522	-0.5693	0.5740
creditgrowthfir~	-0.00192803	0.0807067	-0.02389	0.9811
firstdifferencef~	0.00135750	0.00283892	0.4782	0.6365
NetExports	0.100778	0.210805	0.4781	0.6366
DebtGDPRatio	0.0658640	0.281458	0.2340	0.8168

Explained sum of squares = 1.51863

Test statistic: LM = 0.759313,
with p-value = P(Chi-square(5) > 0.759313) = 0.979556

Table 3 – Test for Stationarity

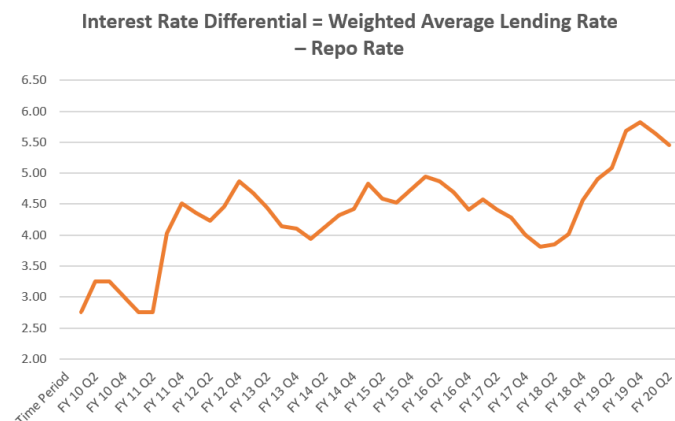
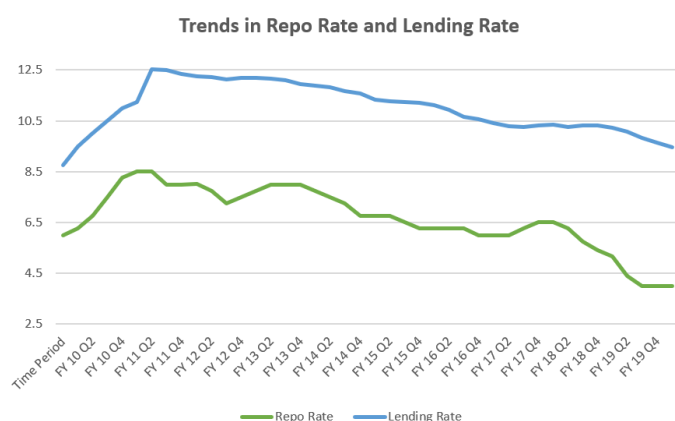
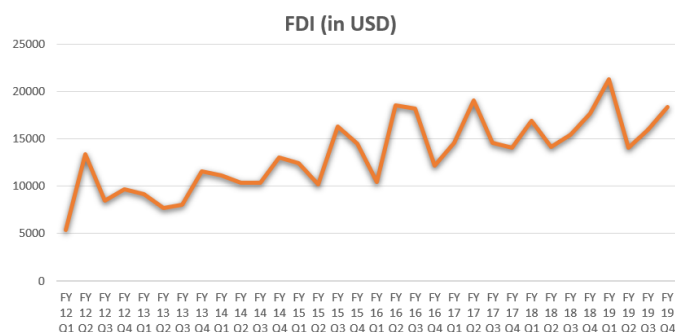
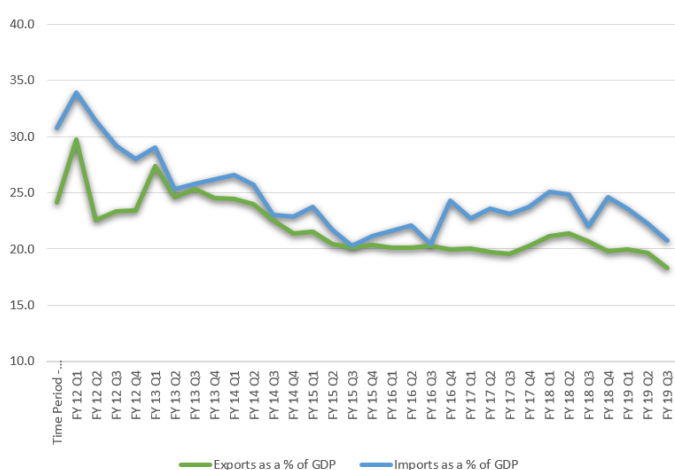
Null Hypothesis – Time series is Non-Stationary/ has a Unit Root

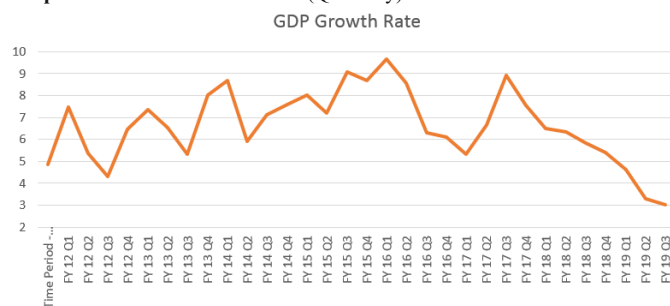
Interpretation – Since p value is less than critical value, we Reject the null i.e Time series is Stationary.

Augmented Dickey-Fuller test for GDPgrowthrate
testing down from 1 lags, criterion AIC
sample size 31
unit-root null hypothesis: a = 1

test with constant
including 0 lags of (1-L)GDPgrowthrate
model: $(1-L)y = b_0 + (a-1)y(-1) + e$
estimated value of (a - 1): -0.529412
test statistic: $\tau_{a,c}(1) = -3.2995$
asymptotic p-value 0.01493
1st-order autocorrelation coeff. for e: 0.102

with constant and trend
including 0 lags of (1-L)GDPgrowthrate
model: $(1-L)y = b_0 + b_1t + (a-1)y(-1) + e$
estimated value of (a - 1): -0.617928
test statistic: $\tau_{a,ct}(1) = -3.93242$
asymptotic p-value 0.01086
1st-order autocorrelation coeff. for e: 0.089

Graph 1 – Depicts the recent historically high gap between Lending rate and repo rate**Graph 2 – Depicts the trends in Repo Rate and Lending Rate over the last 32 quarters****Graph 3 – Quarterly FDI****Graph 4 – Trends in Exports and Imports**

Graph 5 – GDP Growth Rate Trend (Quarterly)**OBSERVATIONS FROM REGRESSION ANALYSIS**

The coefficients of all explanatory variables are statistically significant. While the coefficients for Debt-to GDP ratio and the regression equation constant were significant at 1 % level of significance, the coefficients for Net Exports as a percentage of GDP, credit growth and FDI growth rate were all statistically significant at 10% level of significance. The interest rate differential was however significant at 5% level of significance.

1. **Interest Rate Differential** - The regression results suggest an inverse and statistically significant relationship between the Interest rate differential and the GDP growth rate. This relationship is in line with theoretical expectations. The results imply that as the interest differential i.e the gap between weighted average lending rate and repo rate increases, it decelerates the pace of acceleration of GDP growth rate.

This results bring to light a very important debate that revolves around whether the RBI has scope to lower interest rates further, with some arguing that the central bank needs to give the sluggish economy more help, while others worry more about the revival in inflation. According to Subramanian (2019), this debate is misguided: both views are wrong. According to Subramanian(2019), the problem is the transmission mechanism is broken, and as long as repo rate cuts are not translated into lending rate reductions, policy easing will neither provide support to the economy nor give much boost to inflation. It will remain ineffective (Subramanian, 2019). The regression results here are in confirmation with this ineffectiveness debate. The gap between weighted average lending rate and repo rate has been at a historical high of approximately 5.5% since 2017, suggesting that the lower repo rates are not translating into simultaneous reduction in lending rates. The regression results confirm this phenomenon. The interest rate differential/gap has a statistically significant and negative impact on GDP growth rate. This broken transmission mechanism is rendering the monetary policy ineffective in aiding the economy on the path of GDP growth revival.

2. **Credit Growth** - The rate of Bank Credit Growth of the Scheduled Commercial Banks exhibits a positive and statistically significant relationship with the dependent variable i.e. the GDP growth rate. According to financial economic theory, bank credit growth along with credit-to-GDP ratio, are key indicators of economic growth. These explanatory variables are an indicator of robust demand for credit without the fear of a bubble in the making. A higher incremental credit growth rate indicates aggressive and active participation of the banking sector in the real economy, while a lower number shows the need for more formal credit. This is also a key justification awarded by economists for privatisation of state-run banks wherein increase in credit growth is the larger objective. The results of the regression in question are in line with such economic expectations. These results indicate that a statistically significant and positive relationship exists between Credit growth and GDP growth rate. Policies that incentivize expansion in credit growth of Scheduled Commercial Banks will accelerate the pace of economic growth.

However, the recent liquidity push by the Reserve Bank (decision of lowering Repo Rate by the Monetary Policy Committee) did not seem to have had any tangible impact in pushing credit demand up. Recent incremental credit growth was trending at merely 5.5-6 per cent in April 2020 (lowest since 2016-17). This trend further seems to indicate that the slowdown in monetary policy transmission mechanism (portrayed by the incremental gap between Weighted Average Lending Rate and Repo Rate) is also decelerating another significant monetary policy contributor to GDP, i.e Credit Growth.

3. **Debt-GDP ratio** - The Regression model exhibits a positive relationship between the Debt-to-GDP ratio and GDP Growth Rate. This result is consistent with the chief ideal in Keynesian macroeconomics. According to this theory, although governments strive to lower their debt-to-GDP ratios, this can be difficult to achieve during periods of unrest, such as wartime, or economic recession. In such challenging climates, governments tend to increase borrowing in an effort to stimulate growth and boost aggregate demand. A specific part of this regression's quarterly data set is also overlapping with the period of recent economic slowdown (2018), during which

time, debt-to-GDP ratio (both centre and state combined) saw an upward climb (it stood at 72.3% in 2018-19, a historical high), reflecting the inclination of government's fiscal policy towards Keynesian macroeconomic ideals.

4. **Net Exports as a % of GDP** - Growth in Net Exports exhibits a positive and statistically significant impact on GDP Growth rate. This result is in line with the expectations of the Export led Growth hypothesis, which argues that more rapid growth of exports can lead to higher economic growth because they facilitate more competition, faster technological progress and economies of scale, among other triggers. Promotions to exports through various exports tax concessions, export promotion policies, etc form a significant part of the government's (expansionary) fiscal policy as well. The results here are indicative of the expansionary fiscal policy, specifically those directed towards exports promotion, contributing towards acceleration of economic growth. For instance, in the GST regime, exports are zero rated to ensure that the goods produced in India for exports are not disadvantaged due to the domestic tax burden and stay competitive internationally. Further, under the Foreign Trade Policy, Duty Exemptions Schemes ensure that inputs imported/locally procured for use in the export products are either exempt from duties ab-initio, or the taxes are refunded to the exporters in the form of drawback after exports (Advance Authorization scheme and the Duty Free Import Authorization scheme).
5. **FDI Growth Rate** - Growth Rate of FDI exhibits a positive and statistically significant impact on GDP Growth rate. FDI is a one of the major sources of investment and investment financing that drives the economic growth in the country. The FDI flows are also associated with the enhancement of productivity, skills and technology development in the country. The proactive policy measures and improvement in the ease of doing business in the country resulted in massive improvement in FDI inflows. The FDI equity flows have been on the upswing since FY13. During FY20, total FDI equity inflows were US\$49.98 billion as compared to US\$44.37 billion during FY19 making Indian is the fifth largest recipient of FDI inflows in the world in the same financial year.

CONCLUSION

Explaining what drives the economic growth of an emerging economy like India with diverse sectoral compositions (agriculture remained the sole sector to record positive growth rate during the first quarter after the covid pandemic infused lockdown), complex financial infrastructure (rural financial infrastructure model is distinct from financial inclusion model in urban centres), unique interplay of fiscal policies (simultaneous policies to incentivize foreign investments & domestic asset monetization and social sector schemes like Ayushman Bharat & PDS programmes) and distinct global aspirations (aspiring to become the fastest growing emerging economy and simultaneously struggling to show any distinct improvements in global HDI rankings) is a herculean task in itself. While this paper is merely a clog in the giant wheel of economic research geared towards dissecting economic growth potential of emerging economies, this regression analysis has been able to conclusively depict that a noteworthy proportion of variation in GDP growth of India can statistically significantly be explained by the following economic variables- Credit Growth of Scheduled Commercial, Broken Transmission of Monetary Policy, Debt-to-GDP ratio, Net Exports and FDI growth. The regression analysis showed that Conventional Monetary Policy Tools (lowering interest rates, reforms in Banking Regulations such as Asset Quality Review (AQR) or Prompt Corrective Action (PCA)), appear to remain largely ineffective (statistically insignificant) in aiding the economy on the path of growth revival. Although increased Credit Growth continues to significantly contribute towards GDP growth, Credit growth itself has suffered on account of broken monetary policy transmission, recording its lowest ever growth of just 5.5% in recent years despite liquidity push from the RBI. In contrast, aspects of conventional fiscal policy tools available with the government, in terms of increased government investment (borrowing to finance capital investment increases Debt-to-GDP ratio), promotion to Exports and easing the foreign investment regulations to attract FDI, FPI & FII show a statistically significant impact on GDP growth and can play a pivotal role in revival of the economy caught in a slowdown.

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